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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Attorney Docket No.: SUT-0232
Shoichi OKAMURA et al.	Examiner: A. C. Ho
Application No.: 10/758,022	Art Unit: 2882
Filed: January 16, 2004	Confirmation No.: ***6241***
For: RADIOGRAHIC APPARATUS	

RESPONSE TO NOTICE OF NON-COMPLIANT APPEAL BRIEF

MS APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Notice of Non-Compliant Appeal Brief dated May 2, 2007, Applicants hereby file an Appeal Brief that cures the defect in the Appeal Brief filed on February 16, 2007. The Notice of Non-Compliant Appeal Brief states that the brief does not present an argument under a separate heading for each ground of rejection on appeal. The attached Appeal Brief cures this defect.

Applicant believes that no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 18-0013, under Order No. SUT-0232 from which the undersigned is authorized to draw.

Dated: May 15, 2007

Respectfully submitted,

By _____
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Enclosure: Appeal Brief
DC275249.DOC

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Shoichi OKAMURA et al.	Examiner: A. C. Ho
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APPEAL BRIEF

MS APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Under 37 C.F.R. §41.37, this Appeal Brief is in furtherance of the Notice of Appeal, filed in the above-identified application and the Pre-Appeal Request for Review, filed on October 23, 2006, and appeals the final decision of the Examiner in the final Office Action dated June 23, 2006.

The fees required under § 41.20 and any required petition for extension of time for filing this brief and fees therefor, are provided in the accompanying Transmittal of Appeal Brief. Should additional fees be necessary in connection with the filing of this paper or if a Petition for Extension of Time is required for timely acceptance of the same, the Commissioner is hereby authorized to charge Deposit Account No. 18-0013 for any such fees and Applicant(s) hereby petition for such extension of time.

In compliance with 37 C.F.R. §41.37(a)(1), one (1) copy of this Appeal Brief is hereby filed.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37:

I. Real Party In Interest

II Related Appeals and Interferences

III. Status of Claims

IV. Status of Amendments
V. Summary of Claimed Subject Matter
VI. Grounds of Rejection to be Reviewed on Appeal
VII. Arguments
VIII. Claims
IX. Evidence
X. Related Proceedings
XI. Conclusion
Claims Appendix
Evidence Appendix

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is:

Shimadzu Corporation of Kyoto, Japan ("Shimadzu") is the real party in interest of the present application. An assignment of all rights in the present invention to Shimadzu was executed by the inventors and recorded by the United States Patent and Trademark Office on reel 014906, frame 0724.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claim 1	(rejected)	now being appealed
Claim 2	(rejected)	now being appealed
Claim 3	(rejected)	now being appealed
Claim 4	(rejected)	now being appealed
Claim 5	(rejected)	now being appealed
Claim 6	(canceled)	

IV. STATUS OF AMENDMENTS

An Amendment under 37 C.F.R. §1.111 filed on September 9, 2005, in which claims 1-6 were rejected and claim 1 was amended, was filed subsequent to the first Office Action dated May 19, 2005. Applicants filed an Amendment After Final Rejection under 37 C.F.R. §1.116 on February 16, 2006, amending claim 1 in response to the final Office Action dated November 18 and 2005. The Examiner responded to the Amendment After Final Rejection in an Advisory Action mailed March 1, 2006. Applicants thereafter filed a Request for Continued Examination under Rule 114 on March 15, 2006. A non-final Office Action was mailed on March 30, 2006. On June 9, 2006, Applicants filed an Amendment under 37 C.F.R. §1.111 amending claims 1 and 6. The Examiner issued a final Office Action mailed June 23, 2006, again rejecting claims 1-6. In response, Applicants filed an Amendment After Final Rejection under 37 C.F.R. §1.116 on September 14, 2006, amending claim 1 and canceling claim 6. By an Advisory Action mailed on September 28, 2006, the Examiner again rejected claims 1-6 but indicated that the proposed amendments will be entered for purposes of appeal.

Accordingly, claims 1-5 enclosed herein and recited in Appendix A are the current list of claims of the application under appeal.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1, the sole independent claim, is directed to a radiographic apparatus (all reference numerals of Figure 2; generally, page 12, lines 2-20) for obtaining radiographic images that includes radiation emitting means (1 in Figure 2; page 12, line 3, et seq.), a flat panel x-ray detector (2 in Figure 2; page 12, line 5, et seq.), signal sampling means (3 in Figure 2; page 12, line 7, et seq.) and time lag removing means (11 in Figure 2; page 14, line 21, et seq.). The radiation emitting means (1) emits radiation (dashed lined arrows in Figure 2) toward an object under examination. The flat panel X-ray detector detects the radiation emitted toward the object (patient M in Figure 2) under examination from the radiation emitting means (1) and is

transmitted through the object (M) under examination. The flat panel X-ray detector (2) has numerous radiation detecting elements (2a in Figure 3; page 13, lines 16-17, et seq.) formed of a semiconductor (page 1, lines 20-21) and arranged longitudinally and transversely (page 1, lines 21-22; page 10, line 8) on a radiation detecting surface (page 10, lines 8-9). The signal sampling means (3) takes the radiation detection signals (page 12, lines 7-8) from the radiation detection means (the flat panel x-ray detector 2) at fixed sampling time intervals (Δt in Figure 4; page 12, line 9).

The time lag removing means (11) determines lag-free radiation detection signals (X_k in Step Q3 in Figure 6; Figure 9; page 6, line 25; page 7, lines 9-10, 21-23, et seq.) by subtracting (the minus sign in Equation A, page 15, line 18) a radiation detection signal ($Y_k - X_k = \sum_{n=1}^{N}\{\alpha_n \cdot [1-\exp(T_n)] \cdot \exp(T_n) \cdot S_{nk}\}$; the hatching portion added to the signal X_k during t0 to t1 in Fig. 9) for a lag-behind part (second term in equation A on page 6, line 25, "$\sum_{n=1}^{N}\{\alpha_n \cdot [1-\exp(T_n)] \cdot \exp(T_n) \cdot S_{nk}\}$" corresponds to the lag-behind part shown in the oblique hatches in Fig. 9) from the respective radiation detection signals (page 6, lines 3-5) by a recursive computation (based upon equations A-C on page 6, line 25 to page 7, lines 1-20), on an assumption that, of the radiation detection signals (equivalent to Y_k) taken by the signal sampling means (3) at fixed sampling time intervals (Δt).

The radiation detection signal ($Y_k - X_k = \sum_{n=1}^{N}\{\alpha_n \cdot [1-\exp(T_n)] \cdot \exp(T_n) \cdot S_{nk}\}$; the hatching portion added to the signal X_k during t0 to t1 in Fig. 9) for a lag-behind part left unread ($Y_k - X_k = \sum_{n=1}^{N}\{\alpha_n \cdot [1-\exp(T_n)] \cdot \exp(T_n) \cdot S_{nk}\}$; the hatching portion shown from t1 in Fig. 9) from the radiation detecting means (the flat panel x-ray detector 2) within the fixed sampling time intervals (Δt), to be read at a next reading time (k in Equation A; page 15, line 18; the initial value k=0 is shown on page 19, line2 and k=k+1 is shown on page 19, line 11) and added (equivalent to the hatching portion added to the signal X_k during t0 to t1 shown in Fig. 9) to a radiation detection signal actually read (equivalent to X_k in Equation A; page 15, line 18) at the next reading time (k in Equation A; page 15, line 18; the initial value k=0 is shown on page 19, line2 and k=k+1 is shown on

page 19, line 11), is due to an impulse response (page 15, line 2) formed of one exponential function or a plurality of exponential functions with different attenuation time constants (equations A and C). The radiographic images are derived from the lag-free radiation detection signals obtained by the time lag removing means (11).

VI. Grounds of Rejection to be Reviewed on Appeal

Claims 1 and 3-5 are rejected under 35 U.S.C. 102(b) as anticipated by Hsieh (US Patent No: 5,249,123). The rejection is respectfully traversed.

Claim 2 is rejected under 35 U.S.C. 103(a) as unpatentable over Hsieh as applied to claim 1.

Claims 1, 2 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patent as unpatentable over claims 1, 9, 14 and 15 of U.S. Patent No. 7,006,599.

Claims 1, 2 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patent as unpatentable over claims 1, 2, 4, 10 and 11 of copending application number 10/885,634.

Claims 1, 2 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patent as unpatentable over claims 1, 2 and 5 of copending application number 10/887,920.

Claims 1, 2 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patent as unpatentable over claims 1, 5 and 6 of copending application number 10/901,212.

Claims 1, 2 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patent as unpatentable over claims 1, 3 and 8 of copending application number 10/958,297.

VII. ARGUMENTS

Substantive Rejection under 35 USC 102(B)

Claims 1 and 3-5 are rejected under 35 U.S.C. 102(b) as anticipated by Hsieh (US Patent No: 5,249,123). The rejection is respectfully traversed.

In summary, "lag" in the subject application has a phenomenon completely different from that of "afterglow" in Hsieh. This will be specifically explained below.

The following is stated as the definition of the "afterglow" in Col. 1, L60 to Col.2, L6 of Hsieh (U55,359,638).

"Each X-ray detector 14 comprises a scintillator and solid state photodiode. X-rays striking the scintillator produce light photons which are absorbed by the photodiode creating an electric current. The light is not emitted by the scintillators instantaneously, rather the emission follows a multi-exponential curve. Similarly the light emission does not terminate immediately when the X-ray beam is extinguished, but produces a response from the detector having a decay which can be defined by a multi-exponential function. The time dependence of output signal intensity can be modeled accurately as a sum of several exponential terms with different decay constants. Because the detector array is rotating rapidly about the patient, the exponential decay blurs together detector readings for successive views producing an image artifact referred to as "afterglow"."

That is, "afterglow" described in Hsieh is defined as a phenomenon in which the light is not instantaneously emitted when X-ray enters the scintillator, and in which the light emission does not terminate immediately when the X-ray is extinguished.

This phenomenon is approximated with N number of exponential functions and expressed as a recursive calculation equation, which is the equation of dividing by $\Sigma\beta$ shown as equation 5 of Hsieh.

The "afterglow" is also handled as the same phenomenon in Hsieh (US 6,493,646). That is, the affect is shown to converge at a very short time order (about 0.01 ms in Fig. 4), as shown in Fig. 4. This is an obvious result when considering the delay time constant of the general scintillator.

On the other hand, the subject invention uses a flat panel X-ray detector for X-ray perspective photographing as the detector.

As described in the specification of the subject invention, the detector does not produce the phenomenon of "afterglow" at all, the problem addressed by Hsieh, since the minimum photographing interval is about 1/30sec. That is, the subject invention and Hsieh address completely different matters as a problem.

That is, in the device of the subject invention, the phenomenon of "afterglow" converges from after emission of radiation until the start of reading even if the scintillator is arranged in the photoelectric transfer layer, and thus does not assume the influence of the "afterglow" on the next photography session.

Therefore, the phenomenon of "lag" defined in the subject invention is produced completely independent from the light emitting delay that occurs when the scintillator of Hsieh is used, and is not derived from the model of Hsieh.

The Examiner has found that those skilled in the art can easily replace "constant" with "1" since dividing the numerator by "constant", as shown in equation 5 of Hsieh, is equivalent to the image brightness adjustment, but this finding is not correct.

EU in Hsieh is the ratio of the true signal and the afterimage signal. That is, dividing the numerator by $\Sigma\beta$ is met on the assumption that light emission of the scintillator gradually rises. Furthermore, $\Sigma\beta$ is the ratio of the true signal and the afterimage signal and thus does not become "1". That is, the denominator must take a very small value.

Therefore, for the afterimage property of the subject invention, the configuration of correcting the "lag" of the subject invention cannot be achieved unless a new model that is completely different from the model shown in Hsieh is contrived. In other words, those skilled in the art cannot easily contrive the subject

invention from the model of Hsieh based on the idea similar to the image brightness adjustment.

Furthermore, as shown in the reference drawing (Fig. 1), the cited reference makes an afterimage correction by adding, to an insufficiency Yk1, enclosed in a dashed line, left unread from the radiation detector during a sampling period, a radiation detection signal Yk1' corresponding to the insufficiency Yk1. See Reference Drawing Figs. 1 and 2 attached.

On the other hand, the present invention subtracts a radiation detection signal left unread within a predetermined sampling period, and added superfluously as a radiation detection signal for a lag-behind part at a next sampling time. As shown in the reference drawing (Fig. 2), an unnecessary radiation detection signal Yk0 superfluously added when a radiation detection signal Xkl is acquired, is subtracted and removed from total radiation detection signals. Thus, the cited reference and the present invention are different in the recursive computation algorithm.

It is respectfully submitted that the rejection is improper because the applied art fails to teach each element of claim 1. As a result, it is respectfully submitted that claim 1 is allowable over the applied art.

Claims 3-5 depend from claim 1 and include all of the features of claim 1. Thus, it is respectfully submitted that that the dependent claims are allowable at least for the reason claim 1 is allowable as well as for the features they recite.

Claim 2 depends from claim 1 and includes all of the features of claim 1. Thus, it is respectfully submitted that claim 2 is allowable at least for the reason claim 1 is allowable as well as for the features it recites.

Withdrawal of the rejection is respectfully requested.

Substantive Rejection under 103(a)

Claim 2 is rejected under 35 U.S.C. 103(a) as unpatentable over Hsieh as applied to claim 1. The rejection is respectfully traversed.

Claim 2 depends from claim 1 and includes all of the features of claim 1. Thus, it is respectfully submitted that the dependent claim is allowable at least for the reasons claim 1 is allowable as well as for the features it recites.

Double Patenting Rejection

The Office Action provisionally rejects claims 1, 2 and 6 under five (5) separate rejections as being unpatentable over one issued patent and four different co-pending applications as follows:

1. Claims 1, 2 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patent as unpatentable over claims 1, 9, 14 and 15 of U.S. Patent No. 7,006,599.

2. Claims 1, 2 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patent as unpatentable over claims 1, 2, 4, 10 and 11 of copending application number 10/885,634.

3. Claims 1, 2 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patent as unpatentable over claims 1, 2 and 5 of copending application number 10/887,920.

4. Claims 1, 2 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patent as unpatentable over claims 1, 5 and 6 of copending application number 10/901,212.

5. Claims 1, 2 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patent as unpatentable over claims 1, 3 and 8 of copending application number 10/958,297.

The Office Action asserts that although the conflicting claims are not identical, they are also not patently distinct from each other.

In determining double patenting, the issue is whether any claim of the application defines merely an obvious variation of an invention **claimed** in the earlier patent or application. It does not prohibit a later claiming of subject matter that is

disclosed but not claimed in the earlier patent or application. Double patenting is concerned with attempts to "claim" related subject matter twice. In re Gibbs, 437 F.2d 486, 168 USPQ 578 (CCPA 1971). The issue in addressing the judicially created doctrine of obviousness-type double patenting is whether any claim of the application defines merely an obvious variation of the invention claimed in the earlier patent.

The United States Patent and Trademark Office must establish a *prima facie* case of obviousness-type double-patenting or the rejection, if applied, will be reversed by the Board of Patent Appeals.

The Examiner is obligated to clearly set forth the basis of an obviousness-type double-patenting rejection. Under MPEP 804 II. B. 1., it states:

> Any obviousness-type double patenting rejection should make clear:
>
> (A) The differences between the inventions defined in the conflicting claims--a claim in the patent compared to a claim in the application; and
>
> (B) The reasons why a person of ordinary skill in the art would conclude that the invention defined in the claim in issue is an obvious variation of the invention defined in a claim in the patent.

It is respectfully submitted that the rejection is improper because the Examiner fails to make clear the obviousness-type double patenting rejection, particularly as set forth in subparagraphs (A) and (B) above. As a result, it is respectfully submitted that the Examiner fails to establish a *prima facie* case of obviousness-type double patenting.

Withdrawal of the rejection is respectfully requested.

VIII. CLAIMS

A copy of the claims involved in this appeal is attached hereto in the Claims Appendix.

IX. EVIDENCE

Evidence is being presented as Reference Figs. 1 and 2 attached hereto in the Evidence Appendix.

X. RELATED PROCEEDINGS

None.

XI. CONCLUSION

It is respectfully submitted that the Examiner had failed to establish a *prima facie* case of obviousness for the reasons set forth above as well as a *prima facie* case of double patenting. It is respectfully requested the Board overturn the rejections and allow the pending claims.

Respectfully submitted,

Dated: May 15, 2007 By: _____

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Enclosure(s): Transmittal of Appeal Brief
Claims Appendix
Evidence Appendix (Reference Drawing Figs. 1 and 2)

DC275244.DOC

CLAIMS APPENDIX

Claims Involved in the Appeal of Application No. 10/758,022

1. (Previously Presented) A radiographic apparatus for obtaining radiographic images, comprising:

radiation emitting means for emitting radiation toward an object under examination;

a flat panel X-ray detector for detecting the radiation emitted toward the object under examination from said radiation emitting means and transmitted through the object under examination, the flat panel X-ray detector having numerous radiation detecting elements formed of a semiconductor and arranged longitudinally and transversely on a radiation detecting surface;

signal sampling means for taking radiation detection signals from the radiation detection means at fixed sampling time intervals; and

time lag removing means for determining lag-free radiation detection signals by subtracting a radiation detection signal for a lag-behind part from the respective radiation detection signals by a recursive computation, on an assumption that, of said radiation detection signals taken by said signal sampling means at fixed sampling time intervals, the radiation detection signal for a lag-behind part left unread from said radiation detecting means within the fixed sampling time intervals, to be read at a next reading time and added to a radiation detection signal actually read at the next reading time, is due to an impulse response formed of one exponential function or a plurality of exponential functions with different attenuation time constants;

said radiographic images being derived from said lag-free radiation detection signals obtained by said time lag removing means.

2. (Original) A radiographic apparatus as defined in claim 1, wherein said time lag removing means is arranged to perform the recursive computation for removing the lag-behind part from each of the radiation detection signals, based on the following equations A-C:

$$X_k = Y_k - \sum_{n=1}^{N}\{\alpha_n \cdot [1-\exp(T_n)] \cdot \exp(T_n) \cdot S_{nk}\} \quad \ldots A$$

$$T_n = -\Delta t / \tau_n \quad \ldots B$$

$$S_{nk} = X_{k-1} + \exp(T_n) \cdot S_{n(k-1)} \quad \ldots C$$

where

Δt: the sampling time interval;

k: a subscript representing a k-th point of time in a sampling time series;

Y_k: an X-ray detection signal taken at the k-th sampling time;

X_k: a lag-free X-ray detection signal with a lag-behind part removed from the signal Y_k;

X_{k-1}: a signal X_k taken at a preceding point of time;

$S_{n(k-1)}$: an S_n at a preceding point of time;

exp: an exponential function;

N: the number of exponential functions with different time constants forming the impulse response;

n: a subscript representing one of the exponential functions forming the impulse response;

α_n: an intensity of exponential function n; and

τ_n: an attenuation time constant of exponential function n.

3. (Original) A radiographic apparatus as defined in claim 1, wherein said signal sampling means is arranged to start taking the radiation detection signals at the sampling time intervals before emission of the radiation, and said time lag removing means is arranged to obtain the lag-free radiation detection signals by using said radiation detection signals taken before emission of the radiation.

4. (Original) A radiographic apparatus as defined in claim 1, wherein said signal sampling means is arranged to take the radiation detection signals for one radiographic image continually at each period between the sampling time intervals, and said time lag removing means is arranged to obtain, continually at

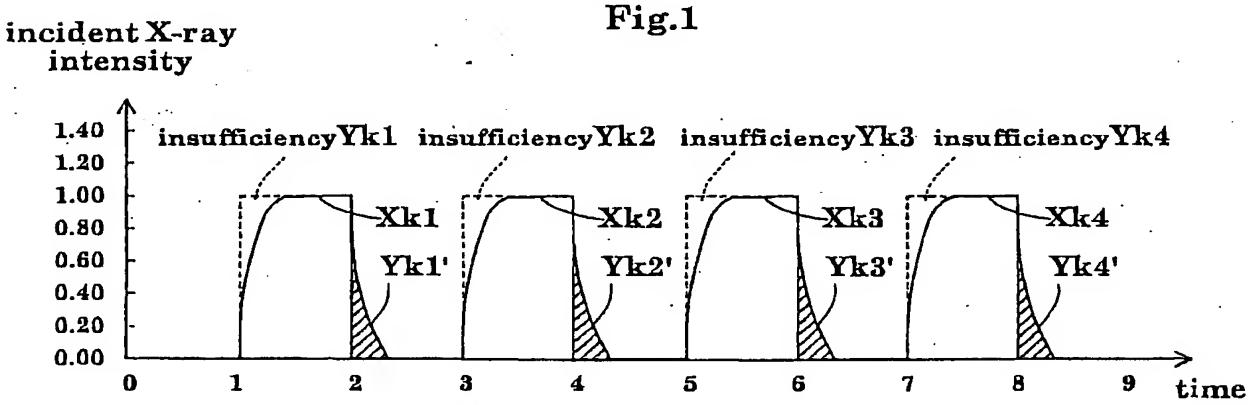
each period between the sampling time intervals, the lag-free radiation detection signals corresponding to the radiation detection signals for the one radiographic image, the radiographic images being obtained continually at the sampling time intervals from said lag-free radiation detection signals for dynamic display.

5. (Original) A radiographic apparatus as defined in claim 4, wherein a computation of said lag-free radiation detection signals and an acquisition and dynamic image display of the radiographic images are performed in real time.

6. (Canceled)

Evidence Appendix

Reference Fig.1



Reference Fig.2